



## SHORT NOTE

### Ant Castes from Intercastes: Much Ado about Nothing

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#### Introduction

The first explanation on the origin of ant soldiers is due to Emery (1894) and it was further developed and supported by Wilson (1954). According to this supposition some ant species first evolved a polymorphic sterile caste comprising minor and major workers with intermediate forms. Later, natural selection favored disappearance of the intermediates and stabilization of the majors as a separate caste, the soldiers. This hypothesis can be tested (falsified) by the observation of typical non-worker (i.e. gyne or male) traits in soldiers.

Baroni Urbani and Passera (1996) suggested that ant soldiers have been directly selected from gynes and not from workers. This hypothesis can be falsified by the observation of typical worker or male traits in soldiers.

Baroni Urbani and Passera's explanation was rejected by Ward (1997) and reaffirmed by Baroni Urbani (1998) with the backing of new supporting examples. Nobody ever criticized the arguments of Baroni Urbani (1998) but this paper had a strong, unpredictable effect on the subsequent ant literature: the term soldier was virtually banned from publication and substituted by "major worker" or by generic statements of worker polymorphism. This attitude suggests, without taking the risk of saying it explicitly, that soldiers are a worker subcaste and not a separate caste as everybody agreed before.

#### Abstract

A recent hypothesis on the origin of ant soldiers by Molet et al. (2012) is shown to be misleading since it is based on unfair, incomplete literature information and to be unscientific since it is not falsifiable.

#### Keywords

Unfair citation, ant castes, ant soldiers.

#### *Caste Nomenclature*

The term soldier, first introduced in entomology by Heer (1852) to describe a peculiar ant morphology, became established for a separate ant caste and accepted by the most influential authors in the literature ranging from Mayr, Emery, Forel, Wheeler, Santschi to Kempf, Brown Jr., Wilson (e.g. 1971: 138 [where soldiers are termed as "a full caste"], and 1976: 355 [distinguishing "three female castes"]), and Bolton (1995 [where soldiers are listed as soldiers, when known, for all ants], but not Bolton, 2003 [where only polymorphic workers are listed for all genera where soldiers were listed in his previous publication]).

By analogy with ants, the term soldier was successfully used also for termites (e.g. Korb, 2008), aphids (e.g. Shibao et al., 2003), and thrips (e.g. Chapman et al., 2002).

A bizarre consequence of the common, undeclared soldier refutation policy among ants is that, in contrast with the above entomological literature, the use of the term soldier appears to have been lately excluded from current literature (i.e. after Baroni Urbani, 1998), even for genera and species where it had been consistently used before (e.g. Shattuck, 1999 [all Australian ants]; Bolton, 2003 [all ants]; Wilson, 2003 [*Pheidole*]; Fernández, 2004 [*Carebara*]; Merti & Traniello, 2009 [*Pheidole*]; and several popular websites such as e.g.



Discover Life, 2014 [*Cephalotes*]; Encyclopedia of Life, 2014 [Family Formicidae and a number of ant genera]; Tree of Life, 2014 [Cephalotini]; Wikipedia, 2014 [*Pheidole*]).

### Discussion

Only recently, ant students started again to use the term soldier. One of these new papers re-using this term (Molet et al., 2012) will be discussed in the following since it contains erroneous statements needing correction.

For example, the authors write properly that often, in ant literature, the term soldier has been wrongly applied to both, a true, discrete soldier caste and to large, polymorphic workers. But, in taking on credit for this idea they dismiss a number of important papers. First, Molet et al. (l.c.: 336) go so far as to summarily reject both recent, documented contributions to the origin of ant soldiers by Baroni Urbani and Passera (1996) and by Ward (1997) since they “have been compromised by semantic problems in distinguishing soldiers and major workers”. As a matter of fact this criticism applies to Ward (1997) only; Baroni Urbani and Passera (1996: 223) wrote: “We do not believe that the largest individuals of continuously polymorphic species [i.e. major workers] are true soldiers”. Not only, but Molet et al. (l.c.) omitted mention to Baroni Urbani (1998), i.e. to an 18 pages study entirely devoted to ant castes as their 13 pages paper. In this study Baroni Urbani (p. 317) made the distinction between soldiers and major worker even clearer and gave credit for first understanding this difference to André (1885), i.e. to a book published over 120 years before Molet et al. (2012).

Molet et al., based on their presumed discovery of the difference between major workers and soldiers, find also a Solomon solution to the dilemma on the worker or gyne origin of soldiers and propose a new hypothesis. Their answer to the problem is that ant soldiers evolved neither from workers nor from gynes, but “from rare intercastes... erratically produced by colonies through environmental or genetic perturbations” (p. 328).

This hypothetical need of pathological, rare intercastes producing soldiers remains entirely gratuitous and unnecessary since it offers no operational advantages on the previously available hypotheses.

On the contrary, since it is impossible to design a test to falsify it, this supposition cannot be considered as a scientific hypothesis (Popper, 1977).

Finally, Molet et al. (l.c.) deserve credit for correctly using the term soldier but repeatedly use another erroneous, self-contradictory name i.e. “winged queen” instead of the correct “winged gyne”. Queen is a function, not a caste name and all ant queens are wingless, by definition.

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